

**Invitation to the talk *Micromechanics and Instability-driven Pattern Formations in Soft Magneto-Active Materials* of Assoc. Prof. Stephan Rudykh, Ph.D., at the GAMM Student Chapter at TU Dortmund University**

Place: MB I - R165 (hybrid)  
Zoom Link: [Link](#)  
Meeting ID: 976 0171 7438  
Passcode: mechanics

Date: Wednesday, 10th May 2023  
Time: 1:00pm (13:00)

**Preliminary agenda**

*TOP 1:* Seminar talk by [Assoc. Prof. Stephan Rudykh, Ph.D.](#) (see abstract below)

*TOP 2:* Discussion and Questions

**Abstract**

Micromechanics and Instability-driven Pattern Formations in Soft Magneto-Active Materials

*Assoc. Prof. Stephan Rudykh, Ph.D.* - University of Wisconsin-Madison

Nature actively uses sophisticated designs of microstructures to achieve astonishing material properties and functionalities. Thus, microstructures give rise to the incredible toughness of mother-of-pearl. Another example is an octopus, an amazingly effective *soft machine* created by nature. The creature can squeeze its whole body through an extremely narrow space while preserving a large variety of functionalities. The nature-created soft machine comprises highly deformable composites that are characterized by different dynamically tunable microstructures and phase properties, depending on the required functionalities. Indeed, such materials are highly desirable for many applications, including human-interactive soft robotics, novel actuators and sensors, and biomedical devices.

In this presentation, I will specifically focus on the role of microstructures in the performance of deformable magneto-active composites. We will consider how large magneto-mechanical deformations and *elastic instabilities* can be used to trigger dramatic pattern transformations, and to control a large variety of functionalities; in particular, the design of switchable acoustic metamaterials will be discussed.

Analytical and numerical findings, as well as experimental results of 3D-printed soft composites, will illustrate the ideas.